SLEET AND ICE STORM AT CORPUS CHRISTI, TEX., DECEMBER 19-21 AND 25, 1924 [1]

By J. P. McAuliffe

A sleet and ice storm of great severity, for this region, occurred at Corpus Christi, Tex., December 19, 20, and 21, 1924, and a much lighter fall was recorded on the 25th.[2]

More sleet fell in the severe sleet storm of 1897, but owing to the sparsely settled country at that time, less damage was sustained than in the present storm.

Rain began about 2.10 a. m. of the 19th; at noon the surface temperature sank to freezing, and within half an hour thereafter overhead wires, trees, shrubbery, streets, and sidewalks were covered with a heavy coating of glaze making travel of all sorts difficult and dangerous. The coating on the wires and trees soon became so heavy as to cause the wires to break and branches of trees to collapse, while small ornamental trees and shrubbery were crushed to the ground. In rural districts the burden of ice caused telephonic communication to cease about 3 a. m. of the 19th, but it was not interrupted in the city until later in the day.

The storm persisted intermittently from the 19th to the 21st, during which time 0.3 inch snow and 0.9 inch sleet fell practically all of which remained on the ground. On the morning of the 21st there was an inch of snow and sleet on the ground, a rare occurrence for Corpus Christi.

[1] Condensed from the original.—ED.

[2] This sleet storm was rather general in southwestern Texas on December 19-20. It was due to the same meteorological conditions that produced the Missouri-Illinois storm described in the immediately preceding note.—ED.

THE SQUALL CLOUD IN A THUNDERSTORM; A DIRECT OBSERVATION OF ITS MOTION.

551.515 : 551.576

By David L. Webster

[Stanford University, Palo Alto, Calif., January 13, 1925]

In the very interesting discussion of thunderstorms given by Dr. W. J. Humphreys in his "Physics of the Air," the explanation of the squall cloud, or roll scud, is especially significant because that cloud is often so different in appearance from the main mass of cumulus clouds above it, and because its explanation as a result of interaction between the upward and downward currents is such a neat confirmation of the general theory. Because of these facts, direct observations of the motion in such a cloud are of some interest. As Doctor Humphreys informs me that records of such observations are quite rare, and I happen to have had an exceptional opportunity to make one, I venture to contribute this note in confirmation of the theory.

The occasion for this observation was a cross-country flight in October, 1918, in which Professor, then Major, C. E. Mendenhall and I were over the lower Rappahannock River, Va., in a Curtis JN4H, a small but fairly powerful plane, just as a thunderstorm was getting well started. Having read Doctor Humphreys' description, and seeing a well-developed roll scud under the forward side of this storm, I decided to investigate more closely.

I had had some previous experience with the saw-tooth shaped points that often appear on the tops of fracto-cumuli subject to overrunning winds, and had noted in them eddies with horizontal axes, that could roll an airplane flying through them remarkably suddenly. In fact, since there is plenty of room in which to recover equilibrium, such clouds make interesting opportunities for a form of safe and sane acrobatics different from those possible in still air. It appeared reasonable, therefore, to expect to confirm Doctor Humphreys' statement as to the probable rolling motions in the roll scuds, by flying into it at a small angle, so as to be headed almost along its axis, and seeing whether the airplane would likewise roll with it.

This expectation was not only confirmed, but confirmed to such an unexpected extent that the strain on the wings caused them to creak with a scream audible even through the roar of the motor. I promptly brought the machine up into a stall, to reduce the strain by reducing the airspeed, and dropped out of the cloud rolling with all the angular velocity that the most ardent upholder of this theory of thunderstorms could wish for.

The conclusion is that the theory is confirmed, as far as such an observation can confirm it, but that the experiment shares one characteristic with the famous thunderstorm experiment of Benjamin Franklin, namely, that its repetition is most decidedly inadvisable.

TEMPERATURE OF DEEP WATER

551.463

By W. J. Humphreys

Obviously the temperature of deep water in any given case depends on the supply of heat in the body of water concerned at some previous time, and its subsequent gain and loss of heat. This gain by subsurface water is through conduction from the earth beneath, conduction from the warmer water above, absorption of residual insolation, exothermic, including biological, reactions, and forced convection due to currents and wave agitation. Conduction from the earth is negligibly small, save where the shore effects are relatively large, as in the case of a mere pond. Conduction from above to any considerable depth also is very slow, and the residual insolation energy beyond a few meters extremely small. The heat from animal metabolism and other reactions also clearly is negligible. There remains, then, only forced convection to carry any considerable amount of heat at all far and rapidly below the surface. This too, while exceedingly effective through the first 20 meters or so in the case of medium and larger sized lakes and all other bodies of water of similar area, does not extend to great depths. In fact, owing to forced convection, the temperature of the water is practically the same to 20 meters, more or less, below the surface, and there abruptly changes. Below this discontinuity layer, temperature decreases more and more slowly with depth, and presently becomes substantially constant, however great the remaining depth. This deeper water, then, gets only a negligible amount of heat by conduction, insolation, or convection. That is, it is enclosed by thermally all but impervious walls.

On the other hand, the loss of heat by the deeper water can occur only through conduction, radiation, and the addition of still colder water. Loss of heat by conduction clearly can occur only when the upper, and